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GEOGRAPHIC STRUCTURE OF MILK PRICES 1960-61

UNITED STATES DEPARTMENT OF AGRICULTURE
Economic Research Service
Marketing Economics Division

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Washington, D. C. August 1962

United States Department of Agriculture
1862 1962
Growth Through Agricultural Progress

SUMMARY

Comparison of price maps of dealers' buying prices for fluid milk demonstrated a closer alignment of prices between distant markets and major supply areas during 1960-61 than in either 1953-54 or 1957-58. As in the earlier years, the 1960-61 price surface identified the Atlantic Coastal States as relatively high-priced markets. Buying prices in eastern markets were generally lower, however, in 1960-61 than in 1957-58. The zone of lowest prices -- less than $4.00 per 100 pounds -- was noticeably smaller in 1960-61 than during 1957-58, reflecting higher prices in northern Iowa, northern Illinois, and southern Wisconsin.

In 164 markets east of the Rocky Mountains, dealers' buying prices during 1960-61 increased an average of 18.7 cents per 100 pounds with each 100 mile increase in distance from Eau Claire, Wisconsin. Increases greater than 18.7 cents were observed in a majority of Middle Atlantic and South Atlantic markets. On the other hand, Class 1 prices in most of the markets in the New England, North Central, and South Central regions increased less than 18.7 cents per 100 pounds per 100 miles. In addition, deviations of actual buying prices from prices calculated in the price-distance regression were greater in State regulated and unregulated markets than in Federal Order markets.

A recent analysis of long-distance shipments of bulk milk indicated an average transportation rate of 16.4 cents per 100 pounds per 100 miles, although rates varied from 14.1 to 19.0 cents. Size and regularity of shipment accounted for most of the variation in rates. Handling charges by plants for weighing, testing, cooling, and loading milk prior to shipment averaged 37 cents per 100 pounds. Variations in these charges ranged from 10 to 70 cents per 100 pounds. These results suggest that the range in total transfer costs (transportation plus handling charge) for inter-market movements of bulk milk during the 1960-61 period would include the 18.7 cents average transfer rate determined from the regression of dealers' buying prices on distance.

The average increase of Class I prices with distance was lower in 1960-61 (18.7 cents) than in 1957-58 (21.8 cents) or in 1953-54 (19.2 cents). Although factor prices in milk transportation have risen in recent years, such increases have been offset in part by increased efficiency of transport firms. For example, larger tankers have resulted from higher weight limits permitted on highways. Similarly, highway improvements -- better roads and more direct routes -- have enabled hauling firms to reduce travel time between markets. For these reasons, a decline in the average price-distance relationship between 1957-58 and 1960-61 was not entirely unexpected.

Blend or uniform prices paid producers in 78 markets east of the Rockies rose 13.8 cents per 100 pounds with each increase of 100 miles from Eau Claire, Wisconsin. Actual blend prices in 51 of the markets were within 25 cents of the prices estimated from the price-distance regression. The tendency for individual handler pool markets to repel milk was also indicated.

GEOGRAPHIC STRUCTURE OF MILK PRICES, 1960-61

By W. T. Butz, agricultural economist
Marketing Economics Division
Economic Research Service

INTRODUCTION

Distance from major supply areas to markets is a key factor in the geographic structure of prices of many farm products. In marketing milk for fluid use, for instance, dealers' buying prices in local markets are influenced by distance of market from the closest major supply area. Under conditions of unrestricted movement of milk, differences in Class I prices would reflect transfer costs between markets. Price-distance analyses of actual prices paid by dealers are useful in identifying markets where Class I prices deviate from the average relationship between dealers' buying prices and distance. In addition to distance from major milk supply areas, other reasons for differences in prices dealers pay are (1) the Federal, State, and local milk regulations; (2) the supply and demand situations in the local markets; and (3) the bargaining positions of producers and distributors. This report deals primarily with the price-distance relationship.

PRICE SURFACES OF DEALERS' BUYING PRICES: 1960-61 AND 1957-58

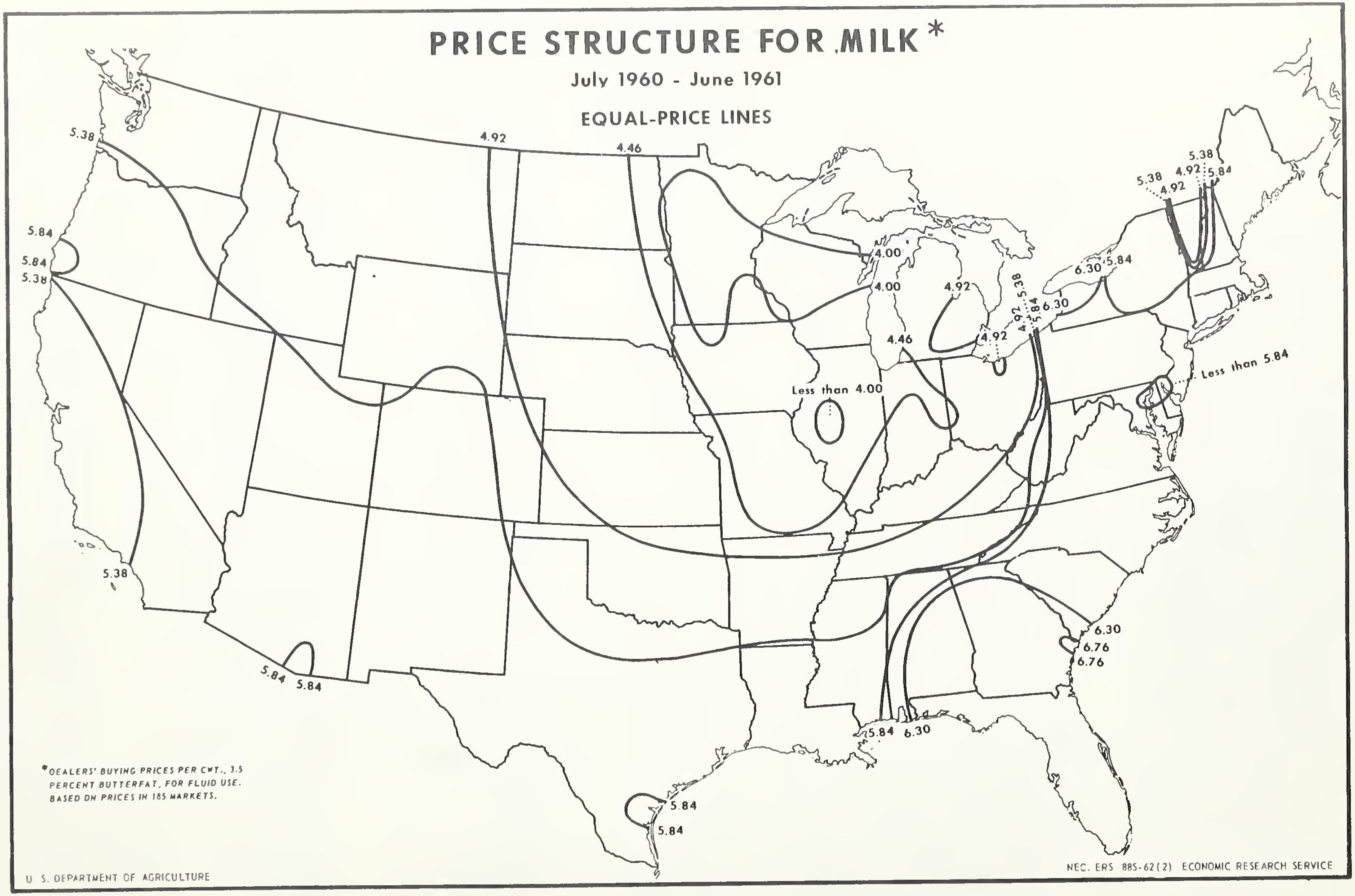
A map illustrating the geographic structure of milk prices during July 1960-June 1961 is shown in figure 1. The map was prepared by plotting local market Class I prices and establishing price zones of 46 cents per 100 pounds, or approximately 1 cent a quart. 1/ Comparable price surface maps were prepared earlier for the 1953-54 and 1957-58 periods. 2/

In 1960-61, the zone of lowest prices -- less than $4.00 per 100 pounds for milk containing 3.5 percent butterfat -- extended over northern and central Wisconsin and most of Minnesota. While this zone was larger in 1957-58 than in 1953-54, it contracted sharply in the 3 years from 1957-58 to 1960-61, and was considerably smaller in 1960-61 than in either of the two earlier periods (figs. 1 and 2). Rising prices in southern Wisconsin, northern Illinois, and northern Iowa were primarily responsible for this.

The western part of the $4.00-$4.46 zone remained relatively unchanged between 1957-58 and 1960-61. Price increases, however, in western Ohio, southern Indiana, and Kentucky after 1957-58 shifted the western edge of this zone sharply to the west and north. Within this zone, an island of less-than-$4.00 prices existed in the Peoria-Springfield area. The $4.92 price contour of the north central production region was likewise unchanged from 1957-58 except for a contraction in the southern part of the zone. Higher prices in central Arkansas, northern Mississippi, and most of Tennessee pushed this zone northward.

1/ F.o.b. city, adjusted to 3.5 percent butterfat. Prices include negotiated premiums, if any.

2/ U. S. Agricultural Marketing Service. Regulations Affecting the Movement and Merchandising of Milk. U. S. Dept. Agr., Mktg. Res. Rpt. 98, pp. 87-100. June 1955; Herrmann, L. F., and Smith, H. V. Geographic Structure of Milk Prices. In U. S. Agr. Mktg. Serv., Marketing and Transportation Situation, pp. 29-32, July 1959.



PRICE STRUCTURE FOR MILK*

July 1960 - June 1961

EQUAL-PRICE LINES

*DEALERS' BUYING PRICES PER CWT., 3.5 PERCENT BUTTERFAT, FOR FLUID USE. BASED ON PRICES IN 185 MARKETS.

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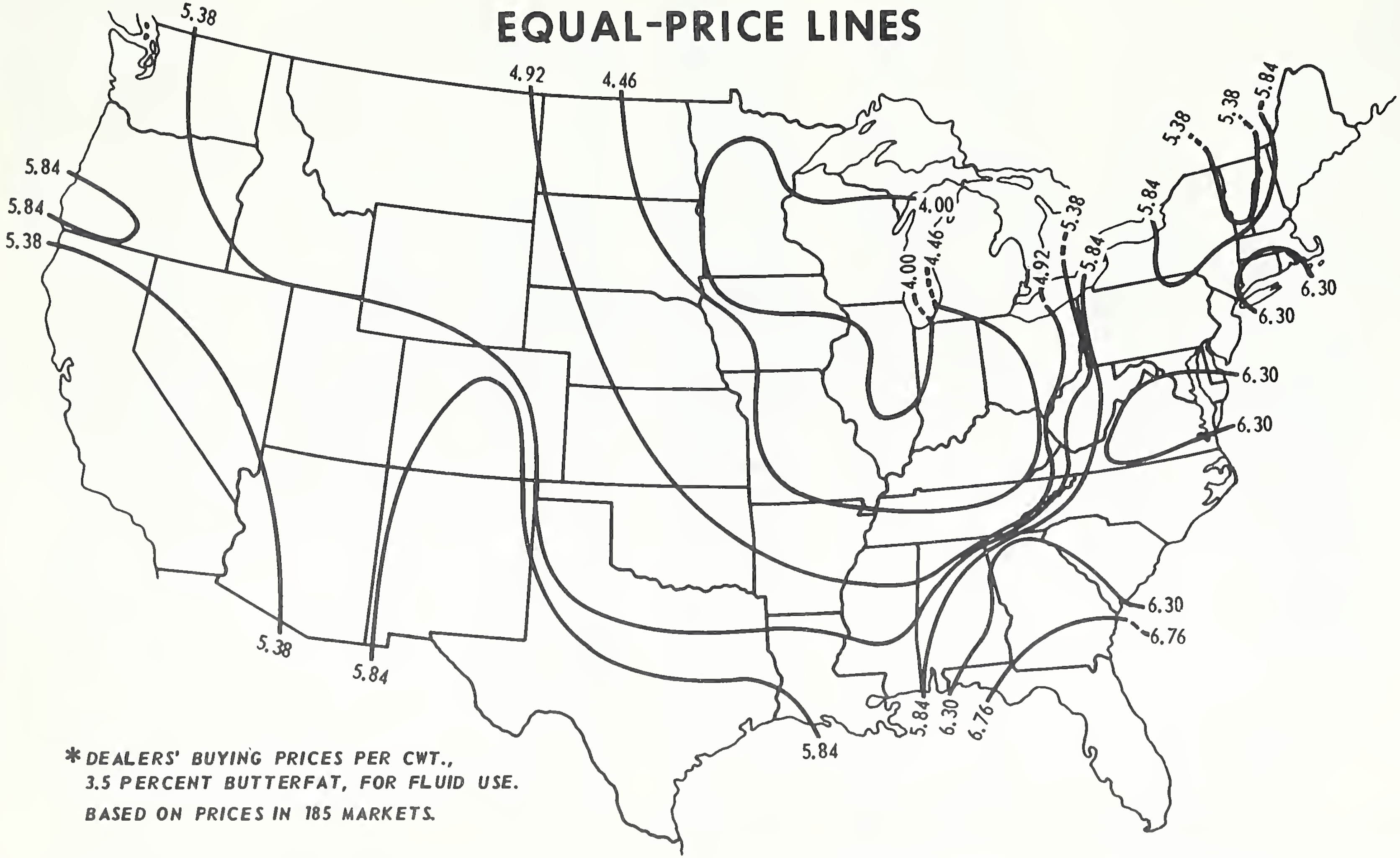
Figure 1

PRICE STRUCTURE FOR MILK*

July 1957 - June 1958

EQUAL-PRICE LINES



* DEALERS' BUYING PRICES PER CWT., 3.5 PERCENT BUTTERFAT, FOR FLUID USE.

BASED ON PRICES IN 185 MARKETS.

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Figure 2

In the Southwest -- particularly in New Mexico and southern Texas -- dealers' buying prices averaged lower in 1960-61 than in 1957-58. In the earlier period, buying prices in local markets in the region were generally in the $5.84-$6.30 zone. During 1960-61, however, nearly all of the Southwest was in the $5.38-$5.84 zone.

The pricing structure in northeastern markets generally reflected slightly lower prices in 1960-61 than in 1957-58. Dealers' buying prices in Vermont -- the traditional "low" priced area of the Northeast -- averaged less than $4.92 in 1960-61 as contrasted to $4.92-$5.38 in 1957-58. Local Class I prices in most northeastern markets averaged between $5.84 and $6.30 per 100 pounds in 1960-61. Major exceptions, in addition to Vermont, were upstate New York and the Wilmington-Baltimore area where dealers' buying prices ranged from $5.38 to $5.84, and the Niagara Frontier where prices averaged over $6.30. The relatively higher priced zones that existed in Connecticut, Rhode Island, and Virginia markets in 1957-58 were not evident in 1960-61.

Except for Florida, southeastern markets displayed little change in price structure between 1957-58 and 1960-61. The over $6.76 zone encompassing southern Georgia and Florida in 1957-58 narrowed by 1960-61 to only the Savannah marketing area. Similarly, the pricing structure of western markets was comparatively stable between 1957-58 and 1960-61, except for the Puget Sound area where buying prices were generally lower in 1960-61. On the other hand, the less-than-$5.38 zone had shifted westward slightly by 1960-61 reflecting somewhat higher Class I prices in western Nevada and southern California.

In summary, the price surface for 1960-61 continued to identify the eastern region generally as "relatively high" priced markets. However, much of the sharp variation in 1957-58 among markets within the region disappeared by 1960-61. In addition, a general widening of price zones in the south-central and southwestern regions suggests that a closer price alignment exists between distant markets and major producing areas than had been evident in either 1953-54 or 1957-58.

RELATIONSHIP OF BUYING PRICES AND DISTANCE

The observed weakening of "high" prices between 1957-58 and 1960-61 in markets considerable distance from the major milk producing area of the country is evident also in the regression of dealers' buying prices on distance. In markets east of the Rocky Mountains, dealers' buying prices for milk for fluid use during the 1960-61 period increased an average of 18.7 cents per 100 pounds per 100 miles distance from Eau Claire, Wisconsin (fig. 3). The regression of price on distance indicated a Class I price of $3.67 for Eau Claire, or 10 cents above the price established for the Eau Claire zone by the Chicago Federal Order. On a comparable butterfat basis, for the 12-month period studied was 43 cents above the Midwestern Condensery Price series and 45 cents higher than the Minnesota-Wisconsin Manufacturing Grade Milk Price series.

Class I prices in 95 of 164 markets studied were below prices calculated in the price-distance regression for 1960-61 (table 1). In half the markets, however, buying prices for milk for fluid use were within 25 cents of calculated prices. In 29 markets, for instance, buying prices were equal to or 1-to-25 cents above calculated prices, whereas in 53 markets dealers' prices were 1-to-25 cents below calculated prices. Dealers' buying prices were above calculated prices in a majority of markets in the South Atlantic and Middle Atlantic regions.

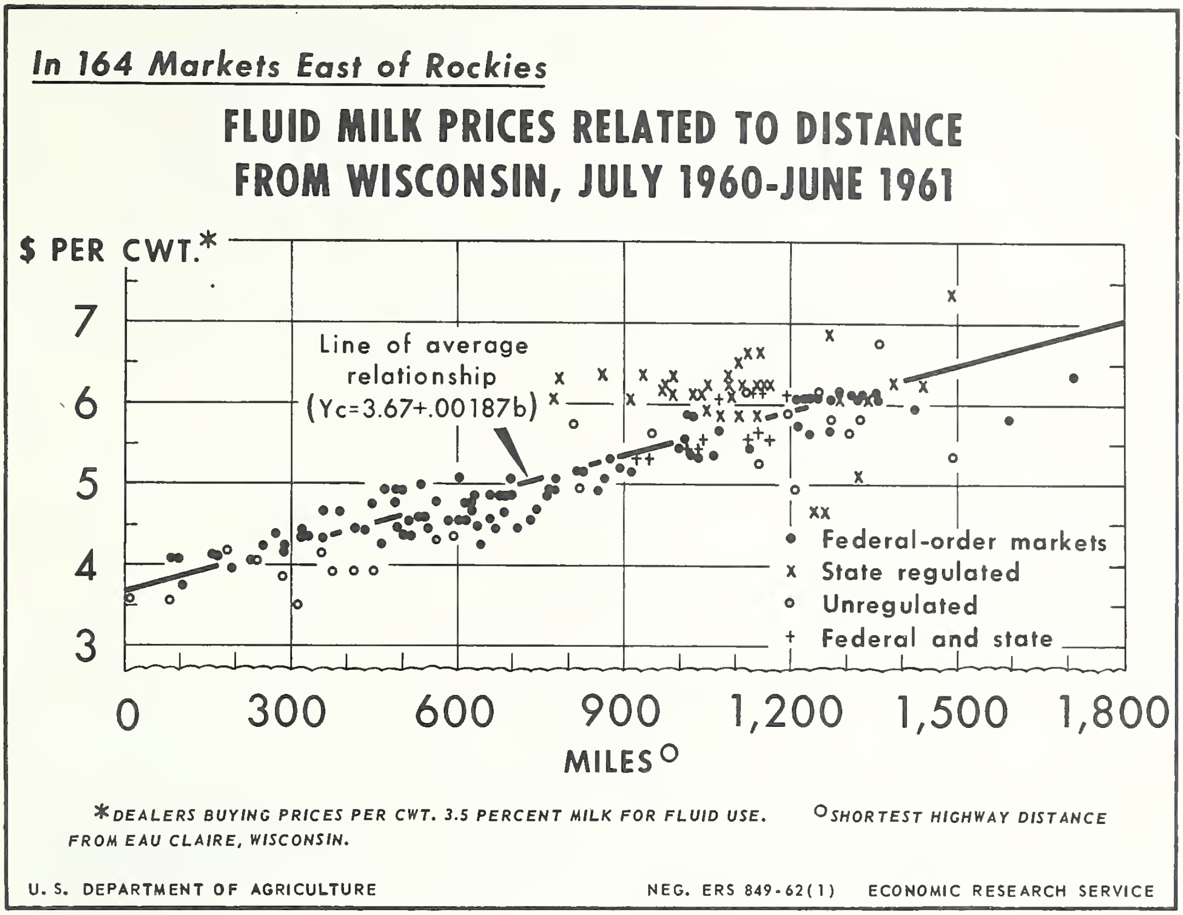

Figure 3

For the most part, dealers' buying prices did not deviate as much from calculated prices in the Federal order markets as in the State regulated or unregulated markets. Average deviation of 28 markets geographically distributed over the country ranged from 40 cents in 1953-54 and 1957-58 to 35 cents in 1960-61 (table 2). Among Federal Order markets, however, the deviation of buying prices from calculated prices averaged 20 cents compared to over 60 cents in the State controlled markets in each of the three periods.

INTERMARKET TRANSFER COSTS FOR BULK MILK

Assuming comparable quality of milk between regions and freedom of movement of milk between markets, the average rate of increase in dealers' buying prices with distance should approximate intermarket transfer costs. Principal items in transfer costs are transportation rates and handling charges at the plant originating the shipment.

Transportation rates vary primarily because of differences in size of load, in regularity of shipment, in opportunity for back-haul, and in intensity of use of hauling equipment. Preliminary results of a study of long-distance movements of milk during the September 1960-August 1961 period indicate that the rate for all shipments -- without regard to such factors as tanker size and regularity of shipment -- averaged 16.4 cents per 100 pounds per 100 miles. Rates varied from 14.1 to 19.0 cents, with differences of approximately 3 cents per 100 pounds per 100 miles between rates

Table 1.--Dealers' buying prices, f.o.b. city, compared with calculated prices, 164 markets east of Rocky Mountains, 1960-61 [1]

Region	Markets in which dealers' buying prices exceed calculated prices by --			Markets in which dealers' buying prices are below calculated prices by --			All markets
	1-25 cents	26-50 cents	Over 50 cents	1-25 cents	26-50 cents	Over 50 cents	
	Number	Number	Number	Number	Number	Number	Number
New England	4	--	--	10	--	2	16
Middle Atlantic	3	4	7	4	--	--	18
East North Central	7	5	--	18	7	1	38
West North Central	9	2	--	4	9	3	27
South Atlantic	3	8	11	2	1	1	[2] 27
East South Central	--	1	2	7	4	1	15
West South Central	--	--	--	6	7	4	[2] 18
Mountain	1	--	--	2	1	1	5
Total	[3] 29	20	20	53	29	13	[3] 164

[1] Based on regression of dealers' buying prices on distance from Eau Claire, Wis. Prices in both series adjusted to 3.5 percent butterfat.

[2] Includes 1 market in which dealers' buying price is equal to calculated price.

[3] Includes 2 markets in which dealers' buying prices are equal to calculated prices.

for a 36,000-pound payload (16.8 cents) in contrast to a 45,000-pound load (14.1 cents) on identical trips. Similarly, for milk shipments of 36,000 pounds for the same distance, rates varied from 14.7 cents per 100 pounds per 100 miles for regular shipments to 16.8 cents per 100 miles for spot shipments. In interstate transportation of milk, back-hauling was rather uncommon; but where a back-haul was obtained, the rates averaged about 15 percent lower. The quantity of bulk milk moving over long distances has been declining in recent years. For instance, in the Chicago Federal Order, bulk sales to nonhandlers outside the surplus milk manufacturing area dropped from 42.7 million pounds during the July 1957-June 1958 period to 12.8 million pounds in 1960-61. To the extent that milk haulers were unable to find other products for shipment, the decreased traffic in milk would tend to hold down hauling rates.

The total quantity of bulk milk moving long distances has declined in recent years as a result of increased supplies of Grade A milk available locally in formerly deficit markets. The quantity of direct-shipped milk, in contrast, has been rising but these shipments make up only a small proportion of the bulk milk moved long distances. Thus, most of the milk moving over long distances is first received at a plant where it is weighed, tested, cooled, standardized, and loaded into tankers.

Table 2.--Dealers' buying prices, f.o.b. city, compared with calculated prices, 28 selected markets, 1953-54, 1957-58, and 1960-61 1/

Region and market	Amount by which dealers' buying price deviates from calculated price		
	1953-54	1957-58	1960-61
	Dollars	Dollars	Dollars
New England:			
Boston	-0.59	-0.07	-0.08
Burlington	-1.63	-1.34	-1.35
Portland	- .43	- .34	- .03
Middle Atlantic:			
Camden	- .12	.21	.17
New York	.22	.47	.35
Philadelphia	- .09	.25	.34
Pittsburgh	.83	1.14	1.18
East North Central:			
Chicago	- .14	- .10	.04
Cincinnati	- .05	- .01	- .05
Detroit	- .23	.10	.26
Indianapolis	- .15	.07	- .11
Milwaukee	- .16	- .02	.17
West North Central:			
Des Moines	.37	.36	.17
Kansas City	- .12	- .02	- .07
Minneapolis	.23	.30	.23
Omaha	.22	.26	.25
St. Louis	.05	- .22	- .27
South Atlantic:			
Charlotte	.32	.43	.54
Jacksonville	.76	.56	.50
Miami	- .02	- .46	- .55
Richmond	.80	.66	.37
Savannah	.86	.61	.83
Washington	1.08	1.23	.28
East South Central:			
Birmingham	.54	.59	.77
Louisville	- .14	- .27	- .22
West South Central:			
Dallas	- .30	- .32	- .29
New Orleans	.08	- .37	- .14
Mountain, Denver	.58	.51	.22
Average deviations: 2/			
All markets	.40	.40	.35
Federal markets	.19	.22	.22
State markets	.63	.65	.64
Unregulated markets 3/	.54	.54	.16

1/ Based on regression of dealers' buying prices on distance from Eau Claire, Wis. All prices adjusted to 3.5 percent butterfat.

2/ Average of absolute deviations, that is, deviations without regard to sign.

3/ Includes 4 markets in 1953-54 and 1957-58, and 2 in 1960-61.

Costs of readying milk for interstate shipment are commonly called handling charges. Among 20 plants in Wisconsin and Minnesota the handling charge for milk moving long distances averaged 37 cents per 100 pounds during the September 1960-August 1961 period. However, charges as low as 10 cents and as high as 70 cents per 100 pounds were observed. While handling charges during 1960-61 were below those reported for previous years in other studies, the increasing quantities of bulk milk handled rather than milk in cans and the recent innovation of bulk reloading stations could account for some reduction in actual plant handling expenses. In any event, the 1960-61 data tend to demonstrate that plant handling charges are competitive and tend to move in the same direction as volume of milk shipped.

Variations in transportation rates and handling charges among haulers and shippers tend to limit the usefulness of comparing total transfer costs as determined from rates and handling charges supplied by transportation and shipping firms with the average price-distance relationship presented in figure 3. Nevertheless, the average increase in dealers' buying prices of 18.7 cents per 100 pounds per 100 miles does fall within the range of estimated transfer costs for the 1960-61 period. Inasmuch as the handling charge is a "fixed" cost, the average rate of 18.7 cents per 100 miles more closely parallels transfer costs for shipments of 800 to 1,000 miles or more than for movements of milk over shorter distances.

The average regression of price on distance was lower in 1960-61 than in either of the two previous periods. In 1960-61, the average rate was 18.7 cents per 100 pounds per 100 miles compared to 21.8 cents in 1957-58 and 19.2 cents in 1953-54. Operating costs of milk hauling firms did not substantiate any reduction in transport rates during the 3-year interval from 1957-58 to 1960-61. On the contrary, these costs rose considerably. For example, wages of truck drivers rose approximately 13 percent during this period, gasoline prices 1 percent; lubricating oils nearly 7 percent, and tank trailers about 25 percent. 3/ Tire and tube prices, on the other hand, were about 9 percent lower.

In recent years, increases in operating costs have tended to be offset, in part, by a rising level of efficiency in transporting milk. Larger tankers, which permit bigger payloads, have been particularly important in offsetting these costs. Tankers with capacities of 35,000-36,000 pounds are still the most common for the country as a whole. Although in a recent equipment inventory of nine milk transport firms in the Lake and Midwestern States, nearly half (48 percent) of the tanks used had capacities of 43,000 pounds (5,000 gallons) or more. This trend toward larger payloads reflects the hauling industry's response to higher weight limits recently permitted by many States. Since 1954, for example, 27 States have passed legislation increasing the gross weights permitted on highways under their jurisdiction. From 1955 to 1961, 6 of the 27 States raised their legal weights twice. As indicated above, use of larger tankers can result in rate reductions of 2-to-3 cents per 100 pounds per 100 miles.

Other technological advances offsetting rising costs in transporting milk are (1) improved and expanded network of roads that has resulted in less travel time; and (2) modernizing loading and unloading facilities so that fuller use is made of the hauling labor and equipment.

Finally, in view of the competitive structure of the milk transportation industry and the sharp decline in volume of milk moved long distances during the last several

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3/ Based on average hourly earnings of nonsupervisory employees in the motor freight transportation and storage industry.

years, a declining price-distance relationship between 1957-58 and 1960-61 does not appear inconsistent with rising factor prices.

As indicated previously, a simple regression of Class I prices on distance does not take into account the effects of other factors on price. 4/ While the impacts of such forces as economic regulation or local supply conditions on prices were not measured, indications are, that Class I prices under Federal regulation varied considerably less from the line of average relationship than those in State regulated or unregulated markets. 5/

RELATIONSHIP OF BLEND PRICES AND DISTANCE

The blend or uniform price paid to producers is the weighted average of the separate prices for the different uses made of milk. Thus, the price-distance regression would be expected to be lower for blend prices than for dealers' buying prices because prices for milk in surplus or manufacturing-uses increase little, if any, with distance, whereas prices for fluid milk increase rapidly with distance.

The regression of blend prices on distance indicated an average increase of 13.8 cents per 100 pounds per 100 miles from Eau Claire, Wisconsin (fig. 4). 6/ The calculated blend at Eau Claire totaled $3.51 per 100 pounds, or 16 cents less than the prices paid for fluid milk for the 1960-61 period. This average increase in uniform prices with distance during 1960-61 was approximately the same as in 1953-54 (13.5 cents), but considerably less than the rate in 1957-58 (17.4 cents).

Four marketing areas located in the northeastern and southern regions exhibited the widest deviation from the line of average relationship between blend prices and distance. Actual blend prices in Boston and New York-New Jersey markets were more than 50 cents per 100 pounds below the blends estimated from the price-distance regression (table 3). In North and South Carolina markets, on the other hand, blend prices were more than 50 cents above the calculated prices. In two-thirds of the 78 markets observed, actual blend prices were within 25 cents of the caluclated prices.

Average prices paid to producers do not indicate the prices at which fluid milk is available for shipment between markets. But blend prices reflect the economic incentive for producers to shift from one market to another. In this respect, the general tendency for individual handler pools to repel milk was observed in the price-distance regression. Of the 78 markets analyzed, 20 operated with individual handler pools. Actual blend prices were below calculated prices in 25 percent of the handler pool markets. In marketwide pools, in comparison, 65 percent of the actual blend prices were less than the calculated blend prices.

4/ The statistical analysis did indicate that nearly 75 percent of the variation in prices was associated with distance.

5/ Standard error of estimate for 164 markets was 43 cents in comparison to 25 cents for Federal regulated markets, 71 cents for State regulated markets, and 48 cents for unregulated markets.

6/ Price paid to all or the major group of producers in the market for all pooled milk. Price includes general premiums negotiated by producers' associations, but excludes bulk tank or other special premiums.

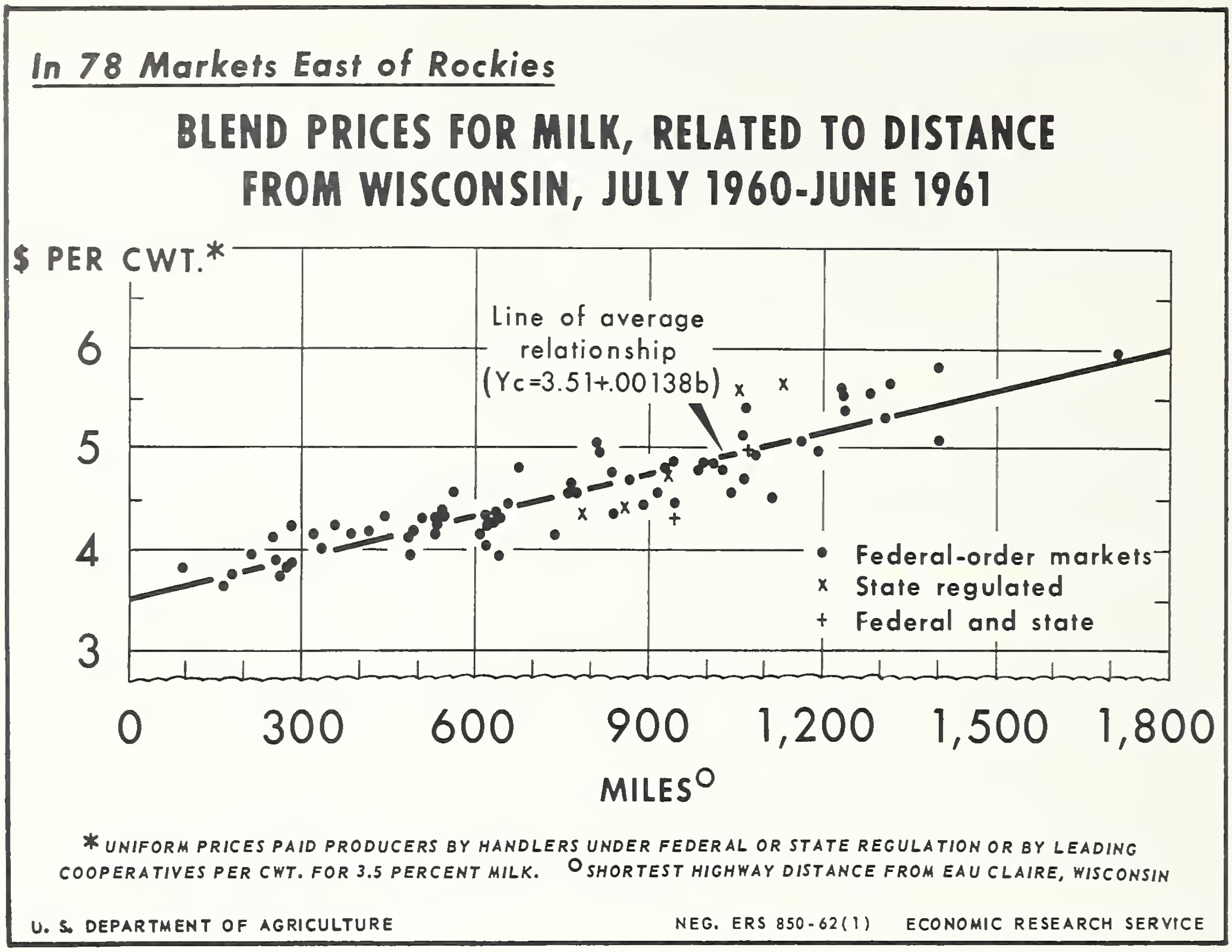
In 78 Markets East of Rockies
BLEND PRICES FOR MILK, RELATED TO DISTANCE FROM WISCONSIN, JULY 1960-JUNE 1961
$ PER CWT.*
3
4
5
6
0
300
600
900
1,200
1,500
1,800
MILES°
Line of average relationship (Yc=3.51+.00138b)
● Federal-order markets
x State regulated
+ Federal and state
* UNIFORM PRICES PAID PRODUCERS BY HANDLERS UNDER FEDERAL OR STATE REGULATION OR BY LEADING COOPERATIVES PER CWT. FOR 3.5 PERCENT MILK.
° SHORTEST HIGHWAY DISTANCE FROM EAU CLAIRE, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
NEG. ERS 850-62(1)
ECONOMIC RESEARCH SERVICE

Figure 4

Table 3.--Comparison of actual blend prices and calculated blend prices, 78 markets, July 1960-June 1961 1/

Region	Markets in which actual blend exceeds calculated blend by --			Markets in which actual blend is less than calculated blend by --			Total markets
	1-25 cents	26-50 cents	Over 50 cents	1-25 cents	26-50 cents	Over 50 cents	
	Number	Number	Number	Number	Number	Number	Number
New England	1	3	--	--	--	1	5
Middle Atlantic	--	--	--	2	2	1	5
East North Central	6	2	--	9	--	--	2/ 18
West North Central	8	1	--	5	4	--	18
South Atlantic	5	1	2	2	--	--	10
East South Central	2	1	--	7	--	--	10
West South Central	--	3	--	3	4	--	10
Mountain	--	--	--	1	1	--	2
Total	22	11	2	29	11	2	2/ 78

1/ Based on regression of blend prices on distance from Eau Claire, Wis.

2/ Includes 1 market (northeastern Wisconsin) in which blend price is equal to calculated price.